DOMINICAN REPUBLIC AND

THE IMPACT ON THE POOR

(Particularly Nutritional Impact)

Report to USDA, Nutrition Economics Group

Under Contract No. 53-319R-0-7

United States Department of Agriculture

Office of International Cooperation and Development

HURRICANE DAMAGE IN THE DOMINICAN REPUBLIC AND THE IMPACT ON THE POOR

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Economic Analysis of Agricultural Policies

1. INTRODUCTION

The purpose of this note is to assess the effects on poor families in the Dominican Republic of the damage caused by Hurricane David and Frederick, with emphasis on the damage to food crops. The information used, which is quite incomplete but is the best available now, comes from the following sources:

Banco Central de la Republica Dominicana, 1ª Encuecta Nacional de Gastos e Imperor de los Hogares (hereafter Encuesta), 1976-77; preliminary data from this survey are used in several of the other documents cited.

C. Diewald, "Incidence of Absolute Poverty: A New Estimate" (World Bank: 23 July 1979, draft - hereafter Diewald).

Secretaria de Estado de Agricultura, "Diagnostico, Estrategio del Desarrollo Agropecuaris, 1976-1986" (Santo Domingo: 1975 - hereafter Diagnostico).

USDA, "Interior Report on Sector Analysis Project Model of Agriculture in the Dominican Republic" (Washington: 23 December 1977 - hereafter Interior Report).

W. Goodwin and R. Castro, "Damage to Agricultural Crops in the Dominican Republic and Estimates of Financial Needs to Re-establish Agricultural Production" (Washington: 17 September 1979, draft memorandum - hereafter Crop Damage).

Mark Green, "Projected Shortfalls in Major Dominican Food Crops Following Hurricanes David and Frederick" (Washington: September 1979 - hereafter Shortfalls).

Four topics are considered in sections 2 through 5, following: (1) the identification of the poor, or approximate target population, (2) the diet of the poor and their dependence on the crops suffering damage, (3) nutritional impact of crop losses and food shortages on the poor, and (4) needs for further information and analysis.

2. IDENTIFICATION OF THE POOR

The Encuesta data have not yet been used to draw a satisfactory profile of the poor in the Dominican Republic, but there has been a preliminary tabulation of family characteristics and family expenditure structure, by levels of total family income. (This preliminary analysis is material for the construction of income-specific price indices by the Banco Central.) Diewald has selected two of these groups for detailed analysis; one consists of urban families with incomes of RD$ 100-200 per month, and the other of rural families with incomes of RD$ 50-100 per month. These groups were selected so that each would include the 20th percentile of the respective (urban or rural) income distribution, in accord with World Bank practive of defining an absolute poverty line relative to the food budget of a household at that point in the distribution. Sample sizes are large enough for analysis (540 and 670 observations), but two limitations of the data stand out. First, they refer, obviously, to the pre-hurricane poor. There is no way to take into account families whose losses from the storms will leave them in poverty. Second, because the strata are defined by total family income, the families vary widely in income per capita; some are extremely poor, while others have per capita

incomes above the national average. This is evident from the summary in Diewald's Table 9 of the structure of subsample characteristics. In short, these strata define the poor only very approximately. The results are reasonable, however, in showing each group as a whole to have mean income only about half that of the respective population.

Using these subsamples to define a food budget, and then adjusting income upward so that total calorie requirements could be met with the same proportions of different foodstuffs, while allowing for non-food expenditures, Diewald derives an absolute poverty line of RD$ 0.66 per person per day in urban areas, and of RD$ 0.49 per person per day in rural areas. At the average family sizes in the two subsamples, the corresponding family poverty line are RD$ 251 and RD$ 157 per month (Diewald's Table 5). Returning to the overall distribution of family income available from the Encuesta, he estimates that 42 percent of urban families and 44 percent of rural families are poor - that is, they have incomes low enough that they probably suffer a deficit in total calorie intake. (Actual diets and intakes are known, however, only for the two subsamples studied.) The total population in poverty, on these estimates, is 1.168 million in urban areas and 1.325 million in rural areas (Diewald's Table 6). Estimates are also available (Diewald's Table 8) of the incidence of poverty by municipios for the 39 municipios surveyed in the Encuesta. Ten municipios which were surveyed were directly in the hurricanes' path; in them, the estimated incidence of poverty is only 14 percent in Azua, but ranges from 33 to 62 percent elsewhere. (Estimates from Diewald, from the map of Hurricane David's path in Crop Damage, and from the identification of the municipios surveyed in the Encuesta.) It does not seem, as a first approximation, as though the hurricanes struck areas with unusually low or high concentrations of poverty. However, this question is important only so far as the poor are affected by destruction of their homes and livelihoods (farms or workplaces), and there is essentially no information on how those sorts of direct damage affected the poor. All poor families, wherever they live on the island, will be affected by the destruction of food crops by the storms.

3. The Diet of the Poor

Budget data have been analyzed only for the two subsamples studied by Diewald; there are as yet no analyses of budgets or diets for the poor in general or for particular geographic groups. Neither does Diewald distinguish farmers from non-farmers who buy all their food.

Food purchases are reported in the Encuesta in both quantities and values. Where more than one quantity unit is reported (pounds, kilos, cans, boxes, etc.) Diewald has assumed constant unit prices and used value data to derive total quantity estimates. These in turn are converted to mean per capita intake in grams per day for 13 food categories, from which estimates of calorie and protein intake can be derived (Diewald's Tables 2 and 3). These estimates show people in the urban stratum to consume on average 2,148 calories per day, or 91 percent of estimated requirements, whereas rural families take in 1,903 calories, which is only 83 percent of requirements. The urban stratum has double the income of the rural stratum, so it is not surprising to find it eating better; it also consumed an average of 55 grams of protein a day (38 percent from animal sources)

versus 44 grams (24 percent animal) for the rural stratum (Diewald's Table 1). In consequence, the urban group pays more on average per gram of protein and per calorie. Whether protein intake is adequate in total--ignoring its composition--depends somewhat on the requirement chosen. Urban dwellers average a satisfactory consumption, but the rural dwellers show a deficit of about 20 percent of needs. Food absorbs 53 and 68 percent of total spending in the two strata studied; the shares of cash expenditure are higher, because housing "expenditure" includes inputed rent. There is no information on dietary adequacy with respect to amino acid composition, essential vitamins, minerals, etc.; it is assumed that whenever calories and total protein are sufficient, other deficiencies are rare and can be met with very little additional expense.

The calorie and protein estimates are based on average contents of major food groups such as cereals, pulses, etc., without distinguishing consumption of those crops grown in the Dominican Republic. Diewald has estimated intake in grams per person per day of many different foods (unpublished worksheets), which show the following results for some of the major domestic food crops (data on crops from Crop Damage):

	Urban (RD$ 100-200 /mo.)			Rural (RD$ 50-100 /mo.)		
Foodstuff*	Total gm.	Calories	gm. Protein	Total gm.	Calories	gm. Protein
Rice	157.6	519	12	149.6	453	11
Corn	12.9	43	1	31.3	109	2
Batata	19.7	18	--	56.1	53	1
Yam	5.1	5	--	5.9	6	--
Potato	10.3	9	--	2.7	3	--
Yautia	6.0	5	--	12.9	12	--
Yuca	52.9	48	--	127.6	116	2
Total roots	(96.0)	(87)	(2)	(209.0)	(196)	(4)
Beans**	29.1	93	5	32.7	105	6
Pigeon peas	6.4	20	1	15.7	50	3
Banana	23.2	17	--	103.7	75	1
Plantain	199.1	159	2	139.4	111	1
Total Crops Indicated:	524.3	938	23	681.4	1099	28
Share of Total Intake(%)	---	44	42	---	58	64

* Calorie and protein contents assumed constant within food groups (cereals, roots, etc.)
**Red and black beans, dry or fresh.

It is evident that even for the urban low-income population, these crops, all of which suffered some hurricane damage, provide close to half of total calories and total protein. For rural dwellers, who eat less animal products and also much less bread (all wheat is imported), around 60 percent of both calories and protein come from these sources. (The contributions of meat--nearly all beef and chicken --milk and dairy products, eggs and fats and oils are given in Diewald's Tables 2

and 3.) The five leading crops, in provision of calories, are rice, corn, yuca, beans and plantains: These provide 40 percent of calories and 36 percent of protein for the urban stratum, and 47 and 50 percent respectively for the rural stratum. All these shares are undoubtedly higher for poor families in general, since the strata include some families with relatively high income per person. Income elasticities are clearly lower for these staples than for wheat, meat, milk, eggs and fish.

4. The Impact of Food Shortfalls

Poor families can be affected by the hurricanes in two ways: as producers whose productive capacity or employment is damaged or interrupted, and as consumers who cannot obtain food and other necessities or can do so only at increased prices. In this section, we discuss only the consumption effects, and only for foodstuffs, because the estimates of storm damage together with what is known of the poor's diet provide a basis for assessment. Much less is known now about the income effects--except perhaps for farmers' incomes--so we discuss in section 5 the needs and uses for more information.

The immediate consequence of the hurricanes is that for some months (t) into the future, output of particular foodstuffs (f) will be smaller in two different ways: (1) As simply the drop in production, corresponding to the amount by which net imports would have to rise to leave consumption unchanged, or by which in trade; or (2) as the difference between normal consumption or demand, and production, including the effect of production loss. The second concept considers normal net imports to be part of the "shortfall", which goes beyond the effects of the storms. However, to the extent that the hurricanes also damaged export crops and so reduced the country's ability to pay for normal imports, or the amount available for export, at least part of normal imports can also be considered "lost" to the hurricane. Stocks are considered to be used up in meeting the shortfall, so stocks as of September 1979, average over the shortfall months, are subtracted from the estimated shortage. We denote concept (1) by S_{ft} and (2) by S_{ft}*. The latter estimates come from Green, Shortfalls, and the former are these amounts less estimated normal imports (from Crop Damage).

How the shortfalls, on either definition, will affect poor consumers over the next year or less will depend on what happens to imports and to prices. Rather than try to guess the future of these variables, we consider two extreme scenarios. In one, the shortfall is shared by all consumers in the same proportion, and prices are unchanged. This corresponds to a "perfect" rationing scheme in which everyone tightens his belt the same amount; the poor are not specifically protected, but neither are they hurt by price increases, with food being bid away by higher income families. In the other scenario, prices rise sufficiently to reduce demand to available supply, the proportional rise being derived from an estimated own-price elasticity in the Interim Report. In the first case, the consumption of the poor is determined directly by the shortfall, and we can estimate its effects on calorie and protein intake. In the second case, one would expect the poor (like all other consumers) to spend more on food but to eat less of it. The exact solution would depend on their needs for other consumption, which is unknown. We therefore calculate only a solution corresponding to their spending all their income on food while prices are high, which is a limiting case. If ever in that case their nutrition would suffer, it obviously would suffer still

more as part of income was put to other uses, none of which--fuel for cooking, transportation to work, rent--are nearly as rigidly necessary as food. In this second scenario, we assume that all food expenditures rise in the same proportion, which is determined by the non-food share in total expenditure before the shortfall. What happens to quantities then depends on price elasticities.

Each of the two types of calculation is carried out with both concepts of the shortfall, S_{ft} and S_{ft}*. Since the shortfall is actually expected to vary from month to month, we consider only a monthly average over the period during which supply and demand are expected to be out of balance, this period ending as early as January 1980 for some crops and as late as November of that year for others: S_f and S_f*, then, are average monthly shortfalls. (The assumption behind this procedure is that stocks and aid could be used to smooth out the shortfalls, and that in any case there is no information available for predicting month-to-month changes in consumers' behavior.

Let C_f be normal total consumption, and let C_{fpoor} be normal consumption by a poor stratum (urban or rural). On the first hypothesis (equal proportional quantity adjustments among consumers), consumption by the poor would become:

$$C_{fpoor} = C_{fpoor}\ (1 - S_f/C_f) \text{ or } C_{fpoor}\ (1 - S_f^*/C_f)$$

On the second hypothesis, let e_f be the own-price elasticity for food f; then the price rise, determined by the behavior of all consumers, is:

$$\frac{(P_f' - P_f)}{P_f} = d \log P_f = \frac{1}{e_f}\frac{S_f}{C_f} \text{ or } \frac{1}{e_f}\frac{S_f^*}{C_f}$$

If the elasticity e_f were constant, it could be used to calculate total expenditure or total quantity of food f consumed; however, this calculation, for the poor, quickly leads to expenditures on individual foods which are comparable to total income or expenditure. We therefore assume, as explained above, that every one of the food expenditures considered uses in the proportion E_{poor}/E_{fpoor}, where E and E_f are respectively total spending and total spending on the foods studied. This guarantees that only those food will be bought, once prices rise; even so, the poor will have to reduce their consumption more than consumers in general, because their incomes are lower. In order to deal with wheat, which is an important foodstuff but is not produced in the Dominican Republic and so suffered no crop damage, we assume that in the absence of relief imports, wheat prices would rise as much as those of rice, and that bread prices would rise about one-half as much. Wheat consumption of the poor then might also fall, despite increased spending.

Note that on the second hypothesis, consumers not only stop buying non-foods, but stop consuming meat, eggs, milk, vegetables other than tubers, and fruits other than bananas and plantains. This is a hypothesis which emphasizes preserving calorie intake, at the expense of protein and other nutrients. Furthermore, shifts in the proportions of foods consumed may worsen the diet by reducing the quality of protein (as in shifts among grains and beans).

Expenditure on food f in a poor stratum will then be:

$$E'_{fpoor} = E_{fpoor} \frac{(E_{poor})}{(E_{Fpoor})}$$

and consumption (quantity) will be:

$$C'_f = C_f \frac{(E_{poor}/E_{Fpoor})}{(1 + e_f S_f/C_f)}$$ on the same term in S^*_f,

where the numerator is the proportional increase of expenditure and the denominator is the proportional increase in price. For wheat products, the value of $e_f S_f/C_f$ is assumed to be one-half that of rice; bread and rice are close substitutes, but the former includes more value added to the grain.

The following table (A) shows the estimates of normal consumption, shortfall, price elasticity and price change for eleven major food crops. Consumption is estimated as equal to production for yams, batata (sweet potato), potato, yautia and bananas. The estimated price elasticity for plantains was applied to bananas; that for sweet potato (batata) was applied to yams; that for yuca, to potatoes; and for yautia, the yuca and batata elasticities were averaged. For pigeon peas and yautia, S^*_f is smaller than S_f, because these crops are normally exported and exports can be curtailed to increase consumption. S^*_f is also below S_f for corn, because available stocks can be used for industry and animal feed but are assumed unfit for human consumption. For yams, sweet potatoes, potatoes and bananas, the two concepts are equal because there is no trade and no industrial use. Both e_f and S_f or S^*_f are shown as positive numbers; all that matters is that they be of the same sign, so that a reduction in supply drives prices up. For each crop, C_f and the shortfall are averages over the period ending in the month indicated in the table; as the shortfall ends for one crop, consumers will presumably buy more of it and ease pressure on other foodstuffs so their prices will fall, but in the absence of any estimates of cross-price elasticities we take no account of such interactions.

Table A shows shortfalls ranging from only five or six percent (beans and sweet potatoes) to as much as half of consumption or more (corn, yuca, and plantains; and yautia if exports are maintained). To bring supply and demand into balance over a period of a year (with shorter periods for corn, rice, beans and potatoes) prices would on average have to double (rise by 100 percent) at least, and might triple or even quintuple for some crops.

It remains to calculate the changes in consumption, on the two hypotheses. The values of E_{poor} and E_{Fpoor} can be estimated from Diewald and the original Encuesta tables, for the urban and the rural stratum, including in E_{Fpoor} only the eleven crops in Table A plus wheat, bread and pasta (in cents per person per day):

	E_{poor}	E_{Fpoor}	Ratio
Urban	112.9	21.0	5.58
Rural	59.9	20.0	3.00

Since even on the worst assumptions few prices would be likely to quintuple, and since the urban stratum appears to be consuming adequate amounts of both calories and protein, it is evident that by concentrating their expenditure on the foods in

Table A

Estimates of Consumption, Shortfalls,
Price Elasticity and Price Change,
Major Food Crops

Crop	Month	Monthly average: C_f	S_f	S_f^*	e_f	Increase in P_f percentage based on: S_f	S_f^*
Rice	6/80	21,300 MT	4,111	26,467	0.07	276	1775
Corn*	3/80	2,700 MT	1,583	1,017	0.40	147	95
Beans	3/80	4,300 MT	366	866	0.09	95	224
Pigeon Peas**	11/80	16,500 Q	16,429Q	4,542Q	0.06	1659	459
Yuca	9/80	17,300 MT	9,533	10,367	0.13	424	461
Yam	8/80	45,333 Q	6,433 Q	6,433 Q	(0.05)	264	264
Batata	8/80	111,667 Q	6,583 Q	6,583 Q	0.05	118	118
Potato	1/80	21,417 Q	6,217 Q	6,217 Q	(0.13)	223	223
Yautia**	8/80	51,043 Q	24,083 Q	7,209 Q	(0.09)	524	157
Banana	8/80	1.55 m/n stems	0.45 m/n stems	0.45 m/n stems	(0.31)	102	102
Plantain	8/80	47,200 MT	25,308	25,342	0.31	200	201

* Much corn goes into animal feed or industrial use. Stocks are assumed available for these uses but not for human consumption.

**S_f^* is less that S_f because the crop is normally exported.

MT = metric tons; Q = quintals (0.059 MT)

(Price elasticities in parentheses are estimated from those for similar crops.)

Sources: Shortfalls from Shortfalls, cumulated over period and averaged per month,
Consumption from Shortfalls for rice, beans, corn, yuca and plantains;
from Interim Report or Crop Damage for other crops, ch. 4.
Price elasticities from Interim Report, ch. 3.

Table A, plus wheat products, they could continue to meet their calorie requirements. Elimination of animal protein would be the chief hardship. The rural stratum, however, might have difficulty defending even a calorie standard, if prices were to rise as indicated in Table A. Particularly for the urban group, it would be more reasonable to assume that they continued to buy some animal products, and both strata would probably buy some fats and oils and perhaps milk and some vegetables as well. It therefore seems preferable to weaken the hypothesis of total dependence on the 12 products discussed, and suppose instead that expenditure should be increased proportionately on all foods. Without estimates of availability and price, we cannot say what quantities of meat, milk, eggs, vegetables, etc. would be consumed, but we can describe the consequences for the 12 products in Table A (including wheat). $E_{F_{Poor}}$ then refers to total food spending, as follows:

	E_{Poor}	$E_{F_{Poor}}$	Ratio
Urban	112.9	60.3	1.67
Rural	59.9	40.6	1.48

and these ratios are used in calculating nutritional consequences under the second hypothesis. The results, in grams per person per day are shown in Table B. Totals for calories and for protein are also shown, but not the contribution of each foodstuff. This hypothesis also allows for consumers to continue to spend part of the budget on non-foods, at the cost of reduced spending on the foods not analyzed (animal products, vegetables etc.).

The results in Table B should, of course, be treated with caution, since we have used fairly rigid hypotheses about reactions to shortfalls, and since there is essentially no information about foods other than those considered in the table. In particular, we cannot say what total calorie and protein intakes would be, even under the hypothetical conditions. What can be said, is that whereas the 12 foods analyzed normally account for about 46 percent of calorie requirements and 50 percent of required protein for the urban stratum, and 52 and 54 percent respectively of the norms for the rural stratum, they might, under the conditions described, provide as little as 14 and 11 percent of the two norms. Calories and proteins as percentages of requirements (not of normal intake) under the different calculations are as follows:

	Urban					Rural				
		Rationing		Expenditure			Rationing		Expenditure	
	Normal	S_f	S_{f*}	S_f	S_{f*}	Normal	S_f	S_{f*}	S_f	S_{f*}
Calories:	46	26	21	22	14	52	32	20	24	17
Protein:	50	27	21	27	11	54	27	23	25	16

Several conclusions seem warranted from these totals. First, under the best of conditions the shortfalls in these crops (with no shortfall of wheat products) will impose large losses if supplies are not markedly increased: typically the shares of requirements that are met are almost halved. It will obviously be difficult or impossible for consumers to make up those losses through other, typically more expensive, foodstuffs, especially since some of them (such as poultry) were also severely damaged by the hurricanes.

TABLE B

Normal Consumption And Consumption After Shortfalls, Urban And Rural Poor: Estimates Under Rationing And Expenditure Hypotheses, With Two Measures Of Shortfall (grams per person per day)

Stratum:		Urban					Rural			
Hypothesis:		Rationing		Expenditure			Rationing		Expenditure	
Product	Normal	S_f	S_{f*}	S_f	S_{f*}	Normal	S_f	S_{f*}	S_f	S_{f*}
Wheat Products	72.0	72.0	72.0	50.5	12.1	247.7	24.7	24.7	15.4	3.7
Rice	157.6	127.1	-0-	66.0	14.0	149.6	120.7	-0-	56.9	11.8
Corn	12.9	5.5	8.0	8.7	11.0	31.3	12.9	15.5	16.8	23.8
Beans	29.1	26.6	23.2	24.9	15.0	32.7	29.9	26.1	24.8	14.9
Pigeon Peas	6.4	-0-	4.6	0.6	1.5	15.7	0.1	11.4	1.3	4.2
Yuca	52.9	23.7	9.5	16.9	15.7	127.6	57.3	23.0	36.0	33.7
Yam	5.1	4.4	4.4	2.3	2.3	5.9	5.1	5.1	2.4	2.4
Batata	19.7	16.5	16.5	15.1	15.1	56.1	52.8	52.8	36.1	36.1
Potato	10.3	7.5	7.5	5.3	5.3	2.7	1.5	1.5	1.2	1.2
Yautia	6.0	3.2	5.2	1.6	3.7	12.9	6.8	11.1	3.1	7.4
Banana	23.2	16.5	16.5	15.2	15.2	103.7	73.6	73.6	76.0	76.0
Plantain	199.1	92.3	92.2	110.8	110.5	139.4	64.7	64.6	66.5	66.5
Total Grams	598.3	395.3	259.7	306.9	226.1	706.1	450.1	313.3	269.0	261.9
Calories	1175	659	497	508	318	1,185	727	458	560	379
Protein	28	16	12	15	6	30	16	13	14	9

Second, it matters considerably what happens to normally imported or exported products: the calorie and protein shortfalls are much larger if trade is interrupted, imports of these foodstuffs being much larger than exports.

Third, although these products are mostly starchy foods, protein adequacy under almost any scenario is not appreciably worse than calorie adequacy: the problem is simply that all intakes will be too low.

Fourth, allowing prices to rise will hurt consumers, although so far as food intake is concerned the effect is less than might be expected. At least, this is true under the more limited definition of shortfall, ^{S}f, and particularly for protein. Under the definition $^{S}f^{*}$, there is much more difference between the "rationing" and the "expenditure" hypotheses. In any case, consumers have other needs to meet, so the assumption of spending everything on food is unrealistic. Finally, all the price calculations assume that incomes are unchanged, which is not the case; consumers will actually be able to adjust less well than these estimates suggest.

Fifth, and somewhat surprisingly, urban consumers may suffer more than those in rural areas, unless they change their diet toward the rural composition. If prices rise, the more efficient rural diet will actually provide larger shares of needs for calories and proteins. (The urban stratum is unfortunately quite varied in income per person; there may be many poor urban families whose diet already resembles the rural pattern.)

These conclusions presuppose that incomes are unchanged, which will not be the case for consumers who lose their crops or jobs as a result of the storms. They will adjust less well to price increases than these estimates suggest. We also suppose that in a shortage, all consumers will have equal access to a given foodstuff at the same price; distribution problems may in fact lead to substantial geographic price variation. Finally, it should be remembered that these estimates are averages over periods of four months to a year, and take no account of variability in supplies and prices. When even the average consequences are so bad, the short-term nutritional effects could be very severe.

5. Needs for Further Information

It would obviously help to have more information about who is really poor in the Dominican Republic, using a stratum of the population defined by consumption per capita, inadequate diet, or some other measure. However, this sort of refinement seems less important than several other lines of analysis that might be pursued, where almost nothing is known now. The chief source of information for the whole population is the 1976-77 Encuesta, but use should also be made of any information that can be gathered from sectors or places particularly affected by the storm. The questions suggestd for immediate investigation are:

(1) What people have lost their jobs and incomes temporarily as a direct result of the storm? Who among them are too poor to survive well while employment is being reconstructed, and therefore need immediate help?

(2) What other jobs will be affected indirectly as a result of the direct damage? Can imports or other forms of special assistance be used to keep industries operating without spreading unemployment?

(3) If people are hired for reconstruction relief, what difference will it make whether they are paid in money or in food? Can anything be said about the consequences for non-food spending, which also needs to be maintained if unemployment is not to spread.

(4) Are there any specific dietary deficiencies likely to result from shifts in food intake in response to shortages? Can likely victims be identified and reached, apart from efforts to provide enough calories and proteins? Here attention should probably focus on children, although general protein inbalances or vitamin/mineral shortages may occur.

All these questions seek information to limit the damage done by the storms and to anticipate and prevent indirect damage of an economic or nutritional sort.

BACKGROUND TABLES

FROM C. DIEWALD,

INCIDENCE OF ABSOLUTE POVERTY

Table 9: CHARACTERISTICS OF URBAN AND RURAL SUBSAMPLES

	Urban	Rural
Sample size		
families	540	670
persons	2,835	3,641
Average family size in sample	5.250	5.434
Average family size in population	5.537	6.055
Average monthly family income		
without transfers	RD $150.74	RD $ 77.46
with transfers	172.40	87.78
As percent of population average		
without transfers	43.42%	45.2%
with transfers	52.04%	47.8%
Average monthly per-capita income		
without transfers	RD $ 28.71	RD $ 14.25
with transfers	32.84	16.15
As percent of population average		
without transfers	51.1%	50.3%
with transfers	54.8%	50.0%
Distribution of households by household income (monthly)		
RD $ 50-100	-0-	82.7%
100-150	34.6%	14.0%
150-200	46.5%	2.1%
200 and over	18.9%	1.2%
Distribution of households by Per-Capital Income (monthly)		
RD $ 0-5	-0-	0.7%
5-10	0.2%	15.8%
10-20	14.4%	44.2%
20-30	24.6%	21.9%
30-40	21.1%	10.0%
40-60	23.1%	6.0%
60-80	10.7%	1.0%
80 and over	5.9%	0.3%

Diewald, Incidence of Absolute Poverty

DOMINICAN REPUBLIC

Table 5: CALCULATION OF ABSOLUTE POVERTY LEVEL

(at 1976-77 prices)

	Urban	Rural
Cost of food basket (per capita, per day)	60.30 cts.	40.57 cts.
Actual calorie intake	2,148	1,903
Calorie Norm [a/]	2,351	2,288
Adjusted cost of food basket (to meet norm)	66.00 cts.	48.78 cts.
Non-food expenditure as percentage of food expenditure	87.3%	47.5%
Adjusted total cost of consumer basket	123.60 cts.	71.94 cts.
Poverty level (monthly)	RD$ 37.60	RD$ 21.88
Poverty level (yearly)	RD$451.11	RD$262.59
Poverty level for families (monthly) (taking average family size of the poor)	RD$251.46	RD$156.50

a/ Adjustments were made for needs of urban and rural population, since age and sex structure is different in two populations. See Technical Notes for method.

Source: Tables 2 and 3, and National Survey Data.

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Table 6: POPULATION IN ABSOLUTE POVERTY[a/]

			Urban	Rural	Total
Average absolute poverty levels (per capita, monthly)	a) for total pop.	RD$	36.85	RD$ 21.46	N.A.
	b) for the poor	RD$	35.94	RD$ 21.31	N.A.
Percentage of families with per capita income under income under poverty level			37.5% (41.9%)	36.4% (44.2)	37.0% (50.1%)
Percentage of respective population with per capita income under poverty level			45.2% (49.4%)	42.9% (50.7%)	44.0% (50.1%)
Poors' share of respective total income			16.9% (19.3%)	19.3% (22.8%)	17.7% (20.9%)
Average family income of the poor (monthly)		RD$	162.62 (152.80)	RD$ 106.00 (94.48)	RD$134.60 (122.67)
Average per capita income of the poor (monthly)		RD$	24.37 (23.38)	RD$ 14.85 (13.62)	RD$ 19.49 (18.19)
Poverty gap[c/] as percent of average income of the poor			47.5% (53.8%)	43.5% (56.3%)	45.9% (54.8%)
Sen-Index of Poverty [d/]			21.5 (26.6)	18.7 (28.5)	20.2 (27.5)
Average per capita income of respective population		RD$	65.16 (59.88)	RD$ 33.13 (30.29)	RD$ 48.36 (44.34)
Average familysize of poor households			6.674 (6.536)	7.138 (6.939)	6.904 (6.731)
Familysize of poor as percent of familysize of total pop.			120.5% (118.1%)	117.9% (114.6%)	119.1% (115.3%)
Estimated size of poor population			1,068,600 (1,167,900)	1,120,900 (1,324,800)	2,189,500 (2,492,700)

a/ Figures in brackets are computed on the basis of reported income, whereas all other figures were derived from "adjusted income". Adjusted income equals expenditure if reported income is less than expenditure, and equals reported income otherwise.

b/ For national estimates urban sub sample was weighted by a factor of 1.39, so that urban population = 47.5% of total population, as estimated for 1977.

c/ Difference between average poverty level and average per capita income.

d/ See text for explanation.

Source: First National Survey on Income and Expenditure of the Families in the Dominican Republic, 1976-77.

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Table 8: Indicators of Poverty by Municipalities

1) Municipality	Poor as % of Population	2)	$ of	3)	of Poverty	4)
Distrito Nacionel	33.8		36.9		12.5	
Santiago	45.0		42.3		19.0	
Higney	36.6		34.4		12.6	
Azua	13.6		42.1		5.7	
San Franisco de M.	37.8		41.2		15.6	
Moca	41.1		26.0		10.7	
Bani	70.5		81.4		57.3	
Pto. Plata	79.8		45.1		36.0	
San Cristobal	37.2		41.0		15.3	
San Juan	39.1		30.3		11.9	
San Pedro de M.	34.5		31.4		10.9	
Cotui	23.8		25.0		6.0	
El Seibo	40.2		29.5		11.9	
La Vega	62.4		53.6		33.4	
Mousenor Nouel	47.5		64.2		30.5	
Gaspar Hernandez	56.8		60.5		34.3	
Nizao	57.3		46.8		26.8	
San Jose de Ocoa	40.7		60.7		24.7	
San Jose de las Matas	33.2		35.3		11.7	
Tamboril	34.1		45.8		15.6	
Hostos	35.5		65.6		23.3	
Altamira	41.2		42.8		17.6	
Los Hidalgos	76.0		63.1		47.9	
Fantino	39.6		32.6		12.9	
Pedro Santana	68.2		53.3		36.3	
Elias Pina	73.3		68.9		50.5	
Villa Allagracia	23.1		39.4		7.5	
Yamasa	33.3		18.5		6.2	
Bayaguana	36.3		38.3		13.9	
Hato Mayor	49.2		53.7		26.4	
Vicente Noble	75.4		84.3		63.6	
Tamayo	60.4		51.7		31.2	
Sanchez	27.5		32.2		8.8	
El Cercado	65.1		63.2		41.2	
Pepillo Saluds	59.8		37.2		22.3	
Nagna	30.6		44.7		13.7	
Tenares	41.7		30.2		12.6	
Laguna Salaola	52.6		48.4		25.5	
Duverge	60.9		75.9		46.2	
All Municipalities of Sample	43.9		45.6		20.0	

Cont. Table 8

1) The list refers only to municipalities and municipal districts covered in the sample (39 out of 99).

2) "Poor" if living in households with per capita incomes (adjusted) below their individual levels.

3) Defined as difference between norm income (poverty level) and actual income (adjusted income), related to actual income.

4) Proposed by A. Sen, derived by multiplying the percentage of poor population by the average relative poverty gap.

Source: First National Survey on Income and Expenditure of the Families in the Dominican Republic, 1976-77.

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Table 2: PER CAPITA DAILY NUTRIENT INTAKE AND EXPENDITURE ON FOOD

A) Urban (RD$ 100-200 monthly family income)

Food Groups	Grams	Daily Cost (cents)	% of Total Cost	Calories (Kcal)	% of Total calories	Protein (grams)	% of Total protein
Cereals	254	12.51	20.75	837	39.0	18.83	34.3
Roots & Tubers	96	1.95	3.23	87	4.1	1.70	3.1
Sugar, Sweets	53	2.01	3.33	204	9.5	0.00	0.0
Pulses 1/	40	3.34	5.54	128	6.0	7.52	13.7
Vegetables	39	2.64	4.38	14	0.7	1.02	1.9
Fruits	307	4.59	7.61	246	11.5	2.46	4.5
Meat	67	10.54	17.48	163	7.6	10.84	19.8
Eggs	10	1.18	1.96	14	0.8	1.13	2.1
Fish	9	1.62	2.69	17	0.7	3.16	5.8
Milk & Cheese	121	5.44	9.02	98	4.6	5.70	10.4
Oils & Fats	30	6.15	10.20	259	12.1	0.03	0.1
Other	--	6.00	9.95	39	1.8	1.36	2.5
Out of Home 2/	--	2.32	3.85	42	2.0	1.08	2.0
Total	(994)	60.30	100.00	2148	100.0	54.83	100.0

1/ Includes some nuts and seeds.

2/ Nutrients per RD$: 50% of average of other categories.

Source: First National Survey on Income and Expenditure of the Families of the Dominican Republic, 1976-77.
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Table 3: PER CAPITA DAILY NUTRIENT INTAKE AND EXPENDITURE ON FOOD

B) Rural (RD$ 50 - 100 monthly family income)

Food Groups	Grams	Daily Cost (cents)	% of Total Cost	Calories (Kcal)	% of Total calories	Protein (grams)	% of Total protein
Cereals	210	10.72	26.4	731	38.4	15.43	35.3
Roots & Tubers	209	3.05	7.5	196	10.3	3.65	8.3
Sugar, Sweets	45	1.57	3.9	168	8.8	0.00	0.0
Pulses 1/	54	3.77	9.3	173	9.1	9.49	21.7
Vegetables	30	1.48	3.6	10	0.5	0.53	1.2
Fruits	342	3.52	8.7	261	13.7	2.80	6.4
Meat	32	4.39	10.8	84	4.4	4.94	11.3
Eggs	5	0.63	1.6	8	0.4	0.59	1.3
Fish	7.5	1.19	2.9	15	0.8	2.40	5.5
Milk & Cheese	57	1.80	4.4	45	2.4	2.64	6.0
Oils & Fats	20	4.36	10.7	177	9.3	0.05	0.1
Others	--	3.36	8.3	18	0.9	0.82	1.9
Out of home 2/	--	0.73	1.8	17	0.9	0.40	0.9
Total		40.57	100.0	1903	100.0	43.74	100.0

1/ Includes some nuts and seeds.

2/ Nutrients per RD$: 50% of average of other categories.

Source: First National Survey on Income and Expenditure of the Families of the Dominican Republic, 1976-77.

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Table 1: Rural--Urban Nutrition and Cost of Food Summary

(absolute figures are per day and per capita)

	Urban	Rural
Income as Reported (incl. transfers)	108.0 cts.	53.1 cts.
Expenditure as Reported	112.9 cts.	59.9 cts.
Expenditure on Food	60.30 cts.	40.57 cts.
Total Estimated Calories	2148 Kcal.	1903 Kcal.
Calories as Percent of Norm	91.4	83.2
Total Estimated Protein	54.8 gram	43.7 gram
Protein as Percent of Norm		
a) Norm = 56 gram	97.9%	78.0%
b) if Norm = 42 gram	(130.5%)	(104.0%)
Share of Animal Protein	38.0%	24.2%
Calorie to Protein Ratio	39.2:1	43.6:1
Cost per 100 calories	2.807 cts.	2.132 cts.
Cost per gram of protein	1.100 cts.	0.928 cts.

Source: First National Survey on Income and Expenditure of the Families of the Dominican Republic, 1976-77.

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